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NO. 236

## Graded Intelligence Tests

For Elementary Schools, High Schools  
and Colleges

Arranged and Standardized

By FRANKLIN O. SMITH

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## Instructions for the Examiners

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# Graded Intelligence Tests

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## FOREWORD

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The practicability of making a mental survey of a large group of persons at one time is one of the latest achievements of applied experimental psychology. The benefits of such a survey have been fully demonstrated by numerous trade tests, by the extensive use of the group method of administering intelligence tests in the various training camps during the war, and by the recent application of this method in a number of colleges and universities.

The various scales for measuring intelligence by Binet, Terman, Yerkes, and others, have initiated a world-wide movement for the organization of various groups on the basis of intelligence. The desirability of making general mental surveys on a large scale has given rise to the group examination of mental aptitudes. The validity and usefulness of the mental survey depends upon the reliability of the group examination. It cannot, of course, do the work of the individual method in making inventories and diagnoses of individual mental traits. The purpose of the group examination in schools is rather to enable superintendents and supervisors to break up large heterogeneous groups into small homogeneous groups in order to adapt instruction to, and deal effectively with, children of different degrees of mental endowment. It is a dragnet test and should not be the final court of appeal in deciding upon an individual pupil's classification. Whenever a child's record in a group examination is poor or differs much from the combined judgments of his teachers respecting his mental ability, the child should be re-tested by the individual method.

## PRELIMINARY CONSIDERATIONS

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The group test can be administered by teachers and supervisors without special training. In order, however, to secure uniformity of procedure, the following precautions are absolutely essential and must be strictly adhered to:

1. Before giving the test, the examiner, i. e., teacher or supervisor, should practice on the directions several times, preferably with other teachers or listeners who are unfamiliar with the tests.

2. The tests should be given in the class rooms under as nearly normal school conditions as possible.

3. Before beginning the test the examiner should make sure that each pupil is supplied with pencils (preferably two) and an eraser.

4. In order that the meaning of each direction may be fully grasped the examiner should speak slowly and distinctly. Pupils who are known to have defective hearing should be seated near the front of the room. The deaf, must, of course, be excluded from the examination.

5. A direction should not be repeated and pupils should not be permitted to ask questions. It is, therefore, very necessary to secure the attention of every pupil before beginning a test.

6. The directions are printed in dark faced type and should be adhered to rigorously. This is exceedingly important if the examination is to be standardized.

# DIRECTIONS FOR ADMINISTERING THE TESTS

## For Grades One, Two, Three and Four

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Begin by saying: "We are going to give you a new kind of examination, some tests to find out how well you can think and remember. I want you to do your best. Work as fast as you can, but try not to make any mistakes, for every mistake will count against you. The tests are in these booklets which we will pass to you. Do not open them until you are told to. Do not look around to see what others are doing, but look at your own booklet. When I say, 'Everyone attention!' you must look at me and listen carefully to what I say."

Pass the booklets to the pupils with the front page up, and then say: "There are some blanks to be filled in on the first page." The examiner should read the first line and direct the pupils to write, or preferably, print their names on the blank space. Proceed in the same way with the other blanks. In the first and second grades the blanks should be filled in by the teachers or assistants before passing the booklets to the pupils. Make sure that the full name is written.

Test 1. When all the blanks of the first page of the booklet have been filled in, say: "Now, everyone, attention! You see the pictures at the bottom of this page. Look at the first square here in the corner." Examiner holds up the booklet and points to the square in the upper left hand corner. "Tell me what you see in this square." Examiner asks what else until all three of the pictures are mentioned by the pupils. "Look at the pictures again and tell me which two things are nearly alike? Yes, the two knives. Which thing is different from the other two? Yes, the scissors. We will draw a line across the scissors and cross them out because they are different from the two knives. Now, look, at the next square by the side of the first one. What do you see? What two things are most alike? What one is different from the other two? Yes, we will cross out the table. Every one cross it out. Now, everyone attention! Look at me until I tell you what to do next. I want you to look at each of the other squares and cross out the thing that is different from the other two. Go ahead."

Allow the pupils three minutes to complete the test. If any one finishes the test say quietly, "Do not turn the page until I tell you to."

Test 2. "Everyone, attention! Turn the page. You see the groups of dots. Look at the first group. Do you see an extra dot—

one that is out of place? Where is it? Yes, above all the others. Take your pencil and cross out the extra dot." (Examiner make sure that all the children get the first one right.) "Now, look at the next group just beside this one. Do you see the extra dot? Yes, right here. Cross it out." (Examiner repeat the instructions for the other three groups on the first line showing the children each time where the dot is. Then say: "Now, everyone attention! I want you to look at each of the other groups on this page and find the extra dot and cross it.")

Examiner allow the pupils three minutes to complete the test.

Test 3. "Every one attention! Look at the next page. You see the four forms at the top of the page. Now look at the first square. You see the four-sided form there in the upper corner." Examiner points to the form in the upper left corner. "Is it just like one of the forms at the top? Which one? Yes, the first one. Do you see the three-sided form? Is it just like one at the top? Yes, the second one. Do you see the form with a notch in one corner? Is it like one at the top. Yes, the third one. Do you see the round one? Is it like one at the top. Yes, the fourth one. Are there still some more forms in the square? Yes, one in the corner down here (point) and the pointed one in this other corner. Are they like any of those at the top? Then cross them both out. Now, look at the next square by the side of the first one. Is there a form here that is different from any of those at the top? All, look carefully. Yes, down here in the corner." Examiner point to it. Cross it out. Now find the forms in the next square that are different from those at the top. Yes, there are two. Cross them out. How many in the next square are different from those at the top? Yes, the pointed one. Cross it out. How many in the last square. Yes, the one here in the upper corner and the one here in the lower corner. Cross them out. Now, every one attention! I want you to find the forms in each of the other squares that are different from those at the top and cross them out. Go ahead."

Allow three minutes to complete the test.

Test 4. "Everyone, attention! Turn the page, whether you have finished this test or not. Here are some more pictures. Look at the first square. What do you see? Are there two things that belong together in some way? Not two things that look alike, but two that belong together in some way." Examiner secure answer from pupils. "Yes, the coffee pot and the tea cup belong together because we make coffee in one and drink coffee from the other. The tin cup does not belong with the other two and we will cross it out. Look at the next square. What two things belong together? Yes, the fishing rod and the fish, because we catch fish with the fishing rod. We will cross out the revolver because it does not belong with the other two. Look at the next square. What two things belong together? Yes, the needle and thread and the thimble, because we use both when we sew. We will cross out the darning needle and yarn because it does not be-



long with the other two. Now look at the other squares and find the thing in each square that does not belong with the other two things and cross it out."

Allow three minutes to complete test.

Test 5. Say: "Everyone attention! Look at the pictures at the bottom of the page. There is something wrong with the boy in the first square. Do you see what it is? Yes, his feet are turned backwards. We will cross them out because they are wrong. What is wrong with the dog in the next square? Yes, he has an extra leg. We will cross it out because it is wrong. What is wrong with the rocking chair? Yes, the back is turned the wrong way. We will cross it out because it is wrong. Now, go ahead and find out what is wrong with the thing in each of the other squares and cross it out."

Allow three minutes.

The first and second grade tests end here. Their booklets should be collected. Third and fourth grades continue to the end of the test.

Test 6. Say: "Every one attention!" (referring to third and fourth grades) "Turn over to the next page. Here are some sentences with the words all mixed up so that they don't make any sense. Let us read the words." Examiner read the first example with the pupils. "Can you change these words around so as to make a sentence that tells something? Yes, 'I see the cat.' But there is an extra word, 'at.' We will cross it out because it does not belong to the sentence." Examiner read the next example with the pupils: "Can you change these words around so as to say something? Yes, 'The knife is sharp.' What word does not belong to the sentence? Yes, 'chair.' Cross it out. Now go ahead and do the other sentences in the same way. Find out what the sentence says and then cross out the extra word that does not belong to the sentence."

Allow three minutes.

Test 7. Say: "Every one attention! Look at Test 7 on this page. Read the first example." Examiner read with the pupils. "What words are names of things that are alike in some way? Yes, examiner read the words. "In what way are they alike? Yes, they all walk. They are all animals. Is there another word that is the name of something different from these? Yes, tree is different. Then cross it out. Now read the next example. What things are alike in some way. Yes," examiner read the words "They are all furniture for the house. What thing is different from the others? Yes, the wagon. Cross it out. Now go ahead and do the others on this page in the same way. Find the thing that is different from the others and cross it out."

Allow three minutes.

Test 8. "Every one, attention! Look at test 8. Read what it says and do what you are told. Write your answers in the blank spaces at the right." Examiner may read with the pupils.

Allow four minutes.

Test 9. "Every one, attention! Look at test 9. Read the first example. What word in the parenthesis means just the opposite of the word 'good' at the left? Yes, 'bad' means the opposite of 'good.' Draw a line through the word 'bad.' Look at the second example. What word in the parenthesis means the opposite of hot? Yes, 'cold.' Draw a line through the word 'cold.' Now do the same with the others. Find the word in parenthesis that means the opposite of the first word at the left and draw a line through it."

Allow one minute

Test 10. "Every one, attention! Look at test 10. Read the words in the example. Try to remember what they are. Now turn over to the next page and look at the example. How many words are there? Yes, there are four. Which word was not in the example on the other page? Yes, 'dress.' Cross it out. Now turn back to the other page and look at the first line. Try to remember the words and turn over to the last page and find the word in the first line which is not in the first line on the other page. When you find it cross it out, then go ahead and do the others in the same way."

Allow two minutes.

# DIRECTIONS FOR ADMINISTERING THE TESTS

## For Grades Five, Six, Seven and Eight

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These tests are intended for the fifth, sixth, seventh, and eighth grades. Each grade will begin with test 1, and perform all of the tests.

Examiner say, "I am going to give you an examination, but you will not write anything. You must think carefully and then make a mark or underline a word to show which is the right answer. Do not begin until I tell you to." Examiner pass the booklets and then say, "Look at the first page. Write your name and age on the first line. Now write your grade and the name of the school." In the seventh and eighth the examiner may merely say, "Fill the blanks at the top of the page" Examiner make sure that the full name is written legibly. Always secure the attention of the pupils before beginning the directions. Speak slowly and distinctly. Allow no questions.

Test 1. When the blanks are all filled, say: "Every one, attention! You see the pictures in the squares. Look at the first square on the top line. What two things belong together? You may answer aloud. Yes, the coffee pot and the tea cup. Cross out the pint cup because it does not belong with the other two. Now, look at the next square by the side of the first one. What two things belong together? Yes, the fishing rod and the fish. Cross out the gun because it does not belong with the other two. Now, all attention! I want you to look at each of the other squares and think which two things belong together, and then cross out the thing that does not belong with the other two"

Allow the pupils one minute to complete the test. Say: "Do not turn the page until I tell you to."

Test 2. When the time is up for the first test say: "Everyone attention! Turn to the next page, whether you have finished the first test or not. Notice the boy in the first square. Do you see something wrong with this boy? Yes, his feet are turned backward. We will draw a line through his feet. What is wrong with the dog in the next square? Yes, he has five legs. Cross out the leg that is wrong." Examiner make sure that every pupil marks out the leg that is wrong. "Now, everyone, attention! I want you to look at the other things and think what is wrong and then cross out the thing that is wrong."

Allow the pupil's one minute.

Test 3. "Everyone, attention!" Look at Test 3. Here are some sentences with the words all mixed up, so that they don't make any sense. Look at the first example." Examiner read the first example with the pupils. "Can you change these words around so as to make a sentence that tells something? Yes, 'A cow eats grass.' But there is an extra word, 'fish.' We will cross out the word 'fish,' because it does not belong to the sentence." Examiner read the next example with the pupils. "Can you change these words around so as to say something? Yes, 'All horses have hair.' What word does not belong to the sentence? Yes, 'Feathers.' Cross it out. Now go ahead and do the other sentences in the same way. Think how the sentence should read and then cross out the extra word that does not belong to the sentence."

Allow one minute.

Test 4. "Everyone, attention! Look at Test 4 on the next page. Read the first example." Examiner read with the pupils. "What words are names of things that are alike in some way? Yes, 'coat,' 'shoes,' 'hat,' 'gloves'. In what way are they alike? Yes, they are all something to wear. Is there another word that is the name of something different from these? Yes, 'sail' is different because it is not something to wear. Cross it out. Read the second example. What word means something different from the other four? Yes, 'potato,' because it is not a fruit. Now do the same with the other lists. Cross out the one thing in each list that is different from the other four."

Allow one minute.

Test 5. "Everyone, attention! Read the example. Which do you think is the worst? Yes, killing. Then cross out the word 'killing.' Now go ahead and do the same with each of the other lists below."

Allow two minutes.

Test 6. "Attention. Look at Test 6. Read carefully and do what you are told."

Allow three minutes.

Test 7. "Everyone, attention! Look at Test 7. Notice the first example. What word in the parenthesis means the opposite of 'black?' Yes, 'white.' Draw a line through the word white. Notice the second example. What word is the opposite of 'long?' Yes, 'short.' Draw a line through the word 'short.' Now go ahead and do the same with each of the others. Draw a line through the word in the parenthesis which means the opposite of the word at the left.

Allow one minute.

Test 8. "Attention. Turn to the next page and look at Test 8. Read the first example. There is one word that spoils the meaning of the sentence; it makes the sentence foolish. What is it? Yes, the word 'good' makes the sentence foolish. It should read 'the catbird made fun of the robin for building such a poor nest. Cross out the

word 'good.' Look at the second example. What word makes the sentence foolish? Yes, the word 'glad.' It should read, 'We are sorry,' etc. Cross out the word 'glad.' Now go ahead and find out what word in each sentence makes the sentence foolish and cross it out."

Allow three minutes.

Test 9. "Read carefully and do what you are told."

Allow three minutes.

Test 10. "Attention. Begin Test 10. If you finish the test before the time is up go on to the next test."

Allow three minutes.

If a pupil completes the last six tests before the time is up he should return his booklet to the examiner and have the time recorded.

Test 11. "Attention! Begin Test 11."

Allow three minutes.

Test 12. "Attention. Begin Test 12."

Allow 5 minutes.

Test 13. "Attention. Begin Test 13."

Allow four minutes.

Test 14. "Attention. Begin Test 14."

Allow two minutes.

Test 15. "Attention. Begin Test 15."

Allow four minutes.

Collect the booklets.

# **DIRECTIONS FOR ADMINISTERING THE TESTS**

## **For High Schools and Colleges**

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### **PREPARATION**

For greater facility of administering the tests, the group to be examined should be divided into sections of not more than 50 students in a section. An examiner and two assistants should be designated for each section. The examiner will conduct the examination which consists chiefly in keeping time (a stop watch is not necessary) and announcing when it is time to begin each test. The assistants will have general charge of the room, pass and collect the booklets, and supervise the examination.

In addition to the examiners and assistants a committee on general arrangements should be appointed to provide rooms, subdivide the group of students into sections and to have general charge of the schedule of examination. It is, of course, important that the examination be conducted in all the sections at the same time.

The examination should begin promptly at the time designated. For this reason, students should be urged to be in their seats before the time for beginning. They should be instructed to bring pens or pencils (preferably two of the latter for each student). The examiner and assistants should be in the room a few minutes before the time to begin to see that a sufficient number of booklets are provided and that all other arrangements are complete.

### **THE EXAMINATION**

When all is ready, the examiner will say, "The examination which you are to take today is intended to test your ability to understand and follow directions, to understand a statement of facts, to think quickly and accurately, to remember, to judge, to plan, and to solve problems. Some of the questions are easy, and some are hard. Remember, that no one is expected to answer all the questions, but the one who answers the largest number correctly in the shortest time will receive the highest rating. If you finish any test before the time is up, begin the next test, and if you finish the entire examination before the time is up, provided you answer every question, you may return your booklet to an assistant and have your time recorded and receive extra credit.

When the time to begin a test is announced every one must begin at once whether he has finished the preceding test or not."

Next, the assistants will pass the booklets. Examiner will say, "Read the first page carefully, but do not turn over the page until you are told to."

Examiner will wait about two minutes and then set his watch at a little before 0 minutes and 0 seconds. At 0 minutes and 0 seconds say, "Turn over the page and begin Test 1."

At the end of 1 minute, say: "Begin Test 2."

At the end of 3 minutes say, "Begin Test 3."

At the end of 5 minutes, say: "Begin Test 4."

At the end of 7 minutes, say: "Begin Test 5."

At the end of 9 minutes, say: "Begin Test 6."

At the end of 11 minutes, say: "Begin Test 7."

At the end of 13 minutes, say: "Begin Test 8."

At the end of 15 minutes, say: "Begin Test 9."

At the end of 18 minutes, say: "Begin Test 10."

At the end of 22 minutes, say: "Begin Test 11."

At the end of 26 minutes, say: "Begin Test 12."

At the end of 31 minutes, say: "Begin Test 13."

At the end of 36 minutes, say: "Begin Test 14."

At the end of 41 minutes, say: "All stop."

Assistants will collect the booklets.

For greater accuracy these tests may be repeated after a recess of ten minutes. If the tests are to be repeated the fact should **not** be announced at the beginning of the examination.

## Directions for Scoring the Tests for Grades One to Eight

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In order to eliminate the personal equation of the examiner, and secure greater facility and accuracy in scoring, there is provided a key. In scoring lay the key on the test so as to read the correct answers at a glance. The number of correct answers in each test is recorded in the blank space below the test. If more than one item in a list is marked where only one is required, the items thus marked should not be counted. For example, in Test 6 of the Primary Examination there is one extra word in each disarranged sentence. If more than one word is crossed out the sentence should not be counted. It is usually more convenient to score the first page of all the booklets of a given grade or group of pupils, and then the second page, and so on.

### RECORDING THE SCORES

In order to present all the scores of each pupils examination on a single page, a record sheet is provided. The number of correct answers for each test is to be recorded in the columns provided for this purpose. The sum of all the points, i. e., correct answers, in each pupil's record gives his total score and should be recorded in the column headed T. S. Other columns are for the Chronological Age (C. A), Mental Age (M A), and Intelligence Quotient (I Q).

For convenience of computation it will be found advantageous to group the pupils by chronological ages. For this purpose ages would be taken at the nearest birthday. For example, if pupil A is 10 years old when he takes the examination in October and his next birthday will be in February, he should be counted in the eleven year group. If, however, his next birthday should be in July he is less than 10 years and 6 months old, and should be counted in the 10 year group. Then all the 10-year-old pupils will be recorded together. Likewise the 11-year-old, 12-year-old, etc, pupils will be grouped together in the record sheet. The advantage of this method will be seen when we consider the interpretation of the records. The most convenient method of procedure will be to determine from the data on the first page of the booklets the chronological age of each pupil to his nearest

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The author desires that one copy of each record containing both the individual and the total scores and the chronological ages, but not the mental ages and intelligence quotient, be sent to him for the purpose of determining norms. If the names of the pupils are included the records will be returned with the mental ages computed. This can only be done after a sufficient number of records have been received to establish satisfactory age norms. Address, Franklin O. Smith, State University of Montana, Missoula, Montana.



birthday and record this near the top of the booklet. The booklets can then be quickly collected into groups according to the chronological ages and the scores recorded.

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## Methods of Interpreting the Data

Two methods of interpreting the records are in use. The simplest method consists in arranging the total scores of different age groups in the order of their magnitude and finding the median of the group. To illustrate, suppose we wish to find the median of the 10-year-old pupils. The scores of all 10-year-old pupils have been recorded together as previously explained. The total scores can now be re-arranged on scratch paper in the order of magnitude and the median quickly obtained. Other groups will be treated in the same way.

Those pupils whose total score is above the median may be regarded as possessing above average mental ability, while those whose total score is below the median possess below average ability. The objection to this method is that it makes no provision for a normal group. It may be useful in cases where only a rough classification into good and poor is all that is desired, but it cannot serve as the basis of any thoroughgoing classification.

A more common method is the three group division into normal, superior and inferior. The total scores are arranged as before in the order of magnitude according to ages and the upper and lower quartiles, i. e., the upper and lower 25 percent, respectively, are determined. The middle 50 percent of the total group in an ideal distribution is the normal group. The upper 25 percent, and the lower 25 percent, are the superior and inferior groups respectively.

For the purpose of adapting instruction to the needs of individual pupils and of otherwise dealing with individual cases in the school, the intelligence quotient, or the percentile rank is essential. The intelligence quotient can be obtained only when mental age norms or standards have been established. The norms for these are only tentative at present owing to insufficient data at hand for complete standardization.

The following rules will yield approximate mental ages:

Score each test 6 months if half of the questions or items are correctly answered. Score each test 10 months if all but one item is correctly answered. Reduce the sum of all the tests for each pupil in any grade to years and months. This is the mental age. To illustrate: In the first two grades there are 5 tests. Suppose pupil A passes the first two tests with only one error in each. The score is 10 months for each test, or 20 months for the two tests. He answers

9 of the items in Test 3, hence his score is 6 months; 10 of the items in Test 4, score 6 months; 4 of the items in Test 5, score 0. The mental age is  $20+6+6$ , or 32 months, or 2 years and 8 months. This result divided by the chronological age gives the intelligence quotient, decimal point omitted.

The significance of the intelligence quotient is indicated by the following distribution of I Q's suggested by Terman.\*

Above 140 I Q.....	Genius or near genius
120 to 140 .....	Very superior intelligence
110 to 119 .....	Superior intelligence
90 to 109 .....	Normal
80 to 89 .....	Dullness
70 to 79 .....	Borderline
Below 70 .....	Distinctly feeble-minded

The percentile rank method requires a separate norm for each age group. Norms for this purpose have not been derived owing to insufficient data.

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\*Terman, The Measurement of Intelligence.

## Directions for Scoring the Tests for High Schools and Colleges

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In general the method of scoring is the same as that for the grades. In Tests 6, 9 and 11 the wrong answers are deducted from the right in determining the score. To illustrate, there are 22 statements in Test 11. Suppose that student A marks 9 of the 22 statements and suppose that 7 of those marked are correct and 2 are wrong. A's score will be  $7-2$ , or 5.

The tests are not all of equal difficulty nor require equal periods of time. The scores of the following tests should be weighted. Multiply the scores of Tests 6, 8, 9, 10, 11, 12, 13, and 14 by 2.

Students who complete the examination in less than the allotted time should receive 3 additional points for each minute saved.

The scores should be recorded the same as in the other examination and the total score determined. From these the median score can be obtained for the whole group or for separate classes. A convenient method of treating the scores is to reduce each total score to percent. This is done by dividing by 2. The maximum score in the examination is 241 or 120.5 percent.

Students scoring above 100 percent possess exceptional ability. Those scoring between 80 and 100 are above average or good; those between 60 and 80, average; those between 40 and 60, poor; those below 40, very poor or failure.





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